

## N- and P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY				
	V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
N-Channel	60	0.030 at V <sub>GS</sub> = 10 V	35	6 nC
		0.033 at V <sub>GS</sub> = 4.5 V	30	
P-Channel	-60	0.050 at V <sub>GS</sub> = -10 V	-19	8 nC
		0.060 at V <sub>GS</sub> = -4.5 V	-15	

### FEATURES

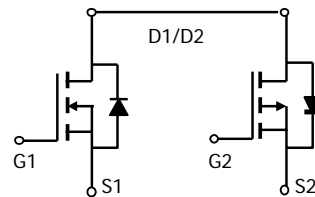
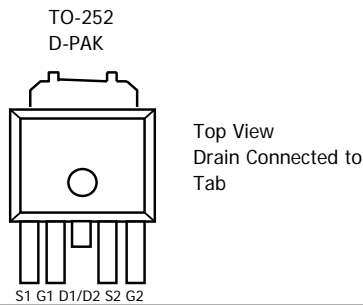
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET<sup>®</sup> Power MOSFET
- 100 % R<sub>g</sub> and UIS Tested



**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
Available

### APPLICATIONS

- CCFL Inverter



N-channel

P-channel

### ABSOLUTE MAXIMUM RATINGS (TA = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Nch Limit	Pch Limit	Units
Drain-Source Voltage	V <sub>DS</sub>	60	-60	V
Gate-Source Voltage	V <sub>GS</sub>	±20	±20	
Continuous Drain Current <sup>a</sup>	I <sub>D</sub>	35	-20	A
Pulsed Drain Current <sup>b</sup>				
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	35	-20	A
Power Dissipation <sup>a</sup>	P <sub>D</sub>	50	50	W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	T <sub>J</sub> , T <sub>stg</sub>	-55 to 175	°C

### THERMAL RESISTANCE RATINGS

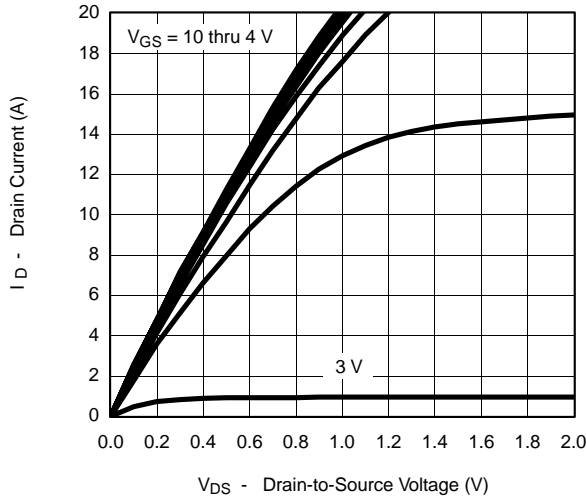
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient <sup>c</sup>	R <sub>θJA</sub>	50	°C/W
Maximum Junction-to-Case	R <sub>θJC</sub>	3	

#### Notes

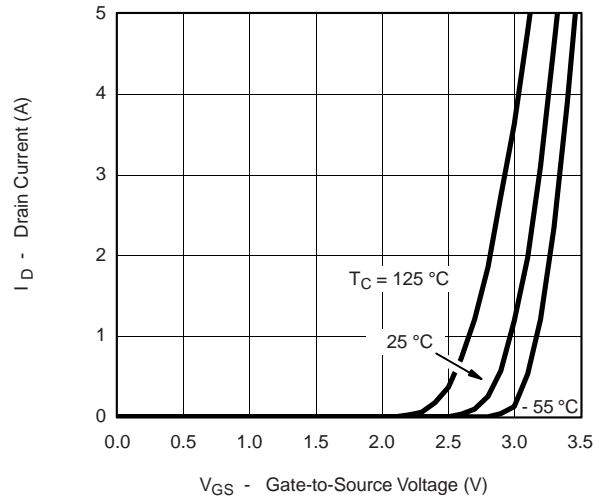
- Package Limited
- Pulse width limited by maximum junction temperature
- Surface Mounted on 1" x 1" FR4 Board.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1		3	V
		$V_{DS} = V_{GS}, I_D = -250 \mu A$	-1		-3	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60 V, V_{GS} = 0 V$			1	$\mu A$
		$V_{DS} = -48 V, V_{GS} = 0 V$			-1	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5 V, V_{GS} = 10 V$	45			A
		$V_{DS} = -5 V, V_{GS} = -10 V$	-25			A
Drain-Source On-Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10 V, I_D = 20 A$		30		m $\Omega$
		$V_{GS} = 4.5 V, I_D = 16 A$		33		
		$V_{GS} = -10 V, I_D = -10 A$		50		m $\Omega$
		$V_{GS} = -4.5 V, I_D = -8 A$		60		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15 V, I_D = 20 A$		15		S
		$V_{DS} = -15 V, I_D = -10 A$		11		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 17 A, V_{GS} = 0 V$		0.89		V
		$I_S = -10 A, V_{GS} = 0 V$		-0.98		V
<b>Dynamic <sup>b</sup></b>						
Total Gate Charge	$Q_g$	N - Channel $V_{DS} = 30 V, V_{GS} = 4.5 V,$ $I_D = 20 A$		9		nC
Gate-Source Charge	$Q_{gs}$			3		
Gate-Drain Charge	$Q_{gd}$			4		
Turn-On Delay Time	$t_{d(on)}$	N - Channel $V_{DS} = 30 V, R_L = 1.5 \Omega,$ $I_D = 20 A,$ $V_{GEN} = 10 V, R_{GEN} = 6 \Omega$		5		ns
Rise Time	$t_r$			5		
Turn-Off Delay Time	$t_{d(off)}$			27		
Fall Time	$t_f$			8		
Input Capacitance	$C_{iss}$	N - Channel $V_{DS} = 15 V, V_{GS} = 0 V, f = 1 Mhz$		1500		pF
Output Capacitance	$C_{oss}$			84		
Reverse Transfer Capacitance	$C_{rss}$			79		
Total Gate Charge	$Q_g$	P - Channel $V_{DS} = -30 V, V_{GS} = 4.5 V,$ $I_D = -10 A$		10		nC
Gate-Source Charge	$Q_{gs}$			5		
Gate-Drain Charge	$Q_{gd}$			4		
Turn-On Delay Time	$t_{d(on)}$	P - Channel $V_{DS} = -30 V, R_L = 3 \Omega,$ $I_D = -10 A,$ $V_{GEN} = -10 V, R_{GEN} = 6 \Omega$		5		ns
Rise Time	$t_r$			4		
Turn-Off Delay Time	$t_{d(off)}$			30		
Fall Time	$t_f$			11		
Input Capacitance	$C_{iss}$	P - Channel $V_{DS} = -15 V, V_{GS} = 0 V, f = 1 Mhz$		1180		pF
Output Capacitance	$C_{oss}$			84		
Reverse Transfer Capacitance	$C_{rss}$			60		

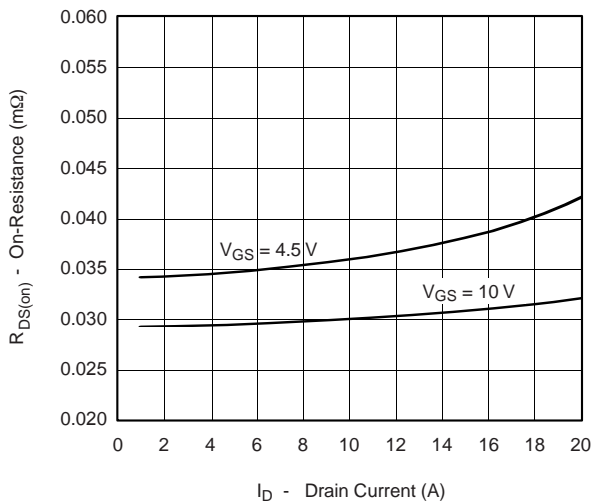
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



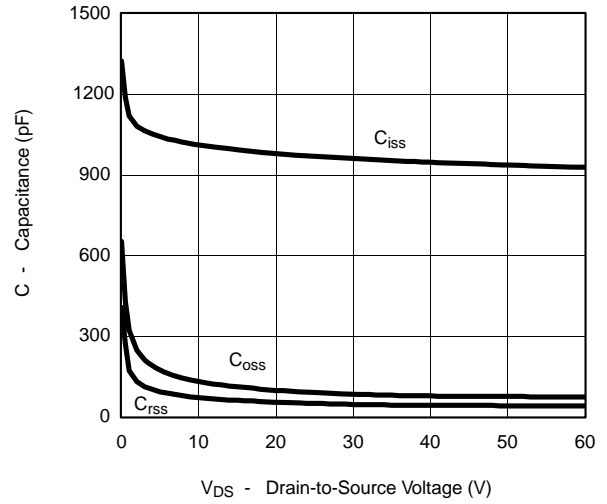
**Output Characteristics**



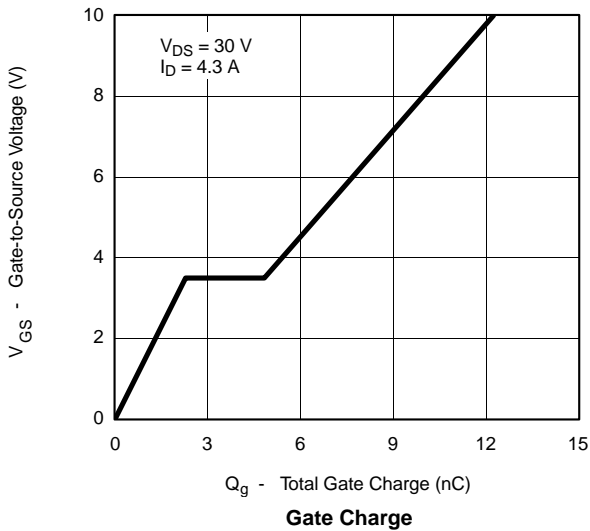
**Transfer Characteristics**



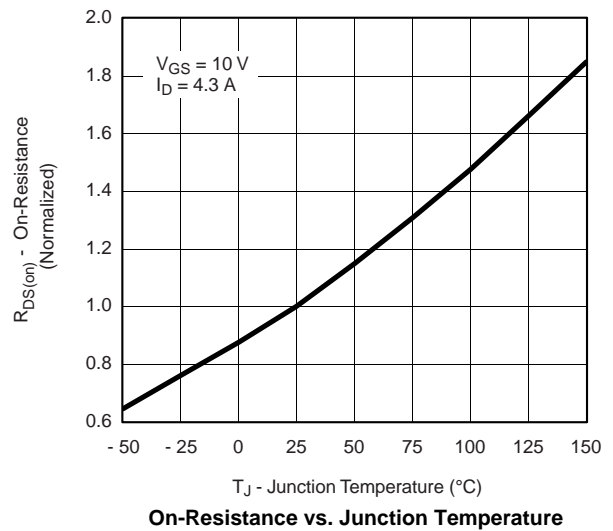
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**

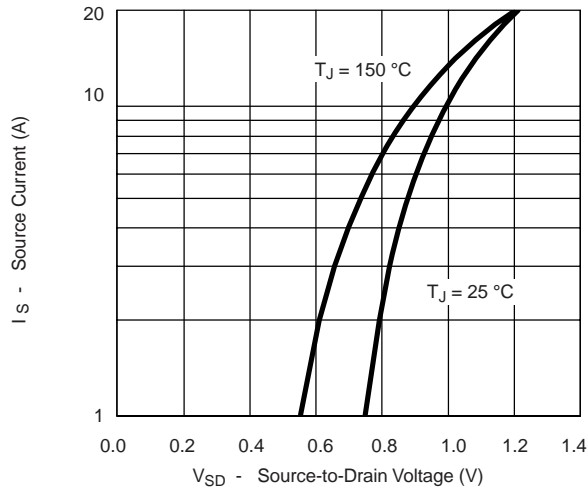


**Gate Charge**

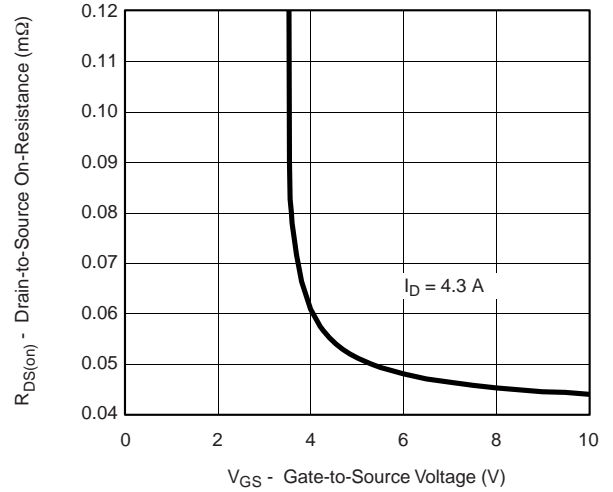


**On-Resistance vs. Junction Temperature**

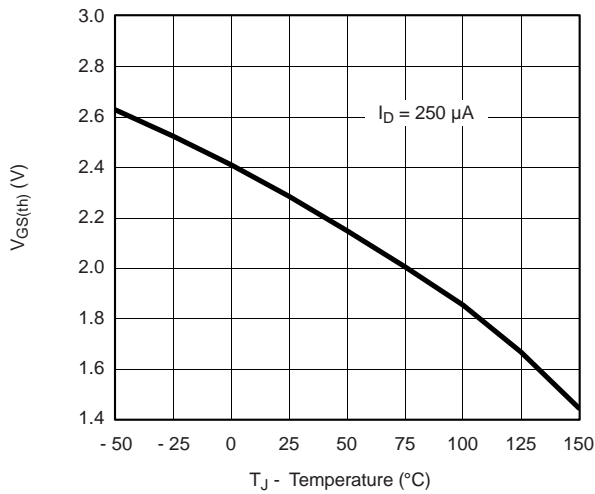
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



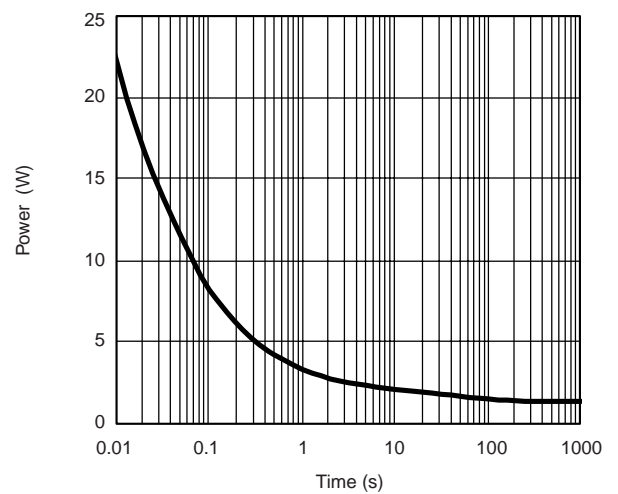
**Source-Drain Diode Forward Voltage**



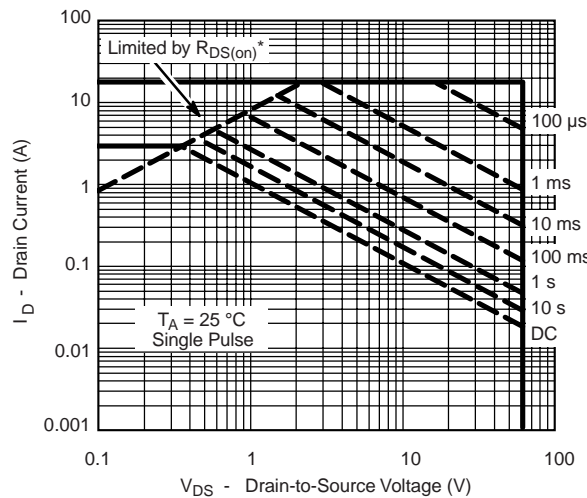
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



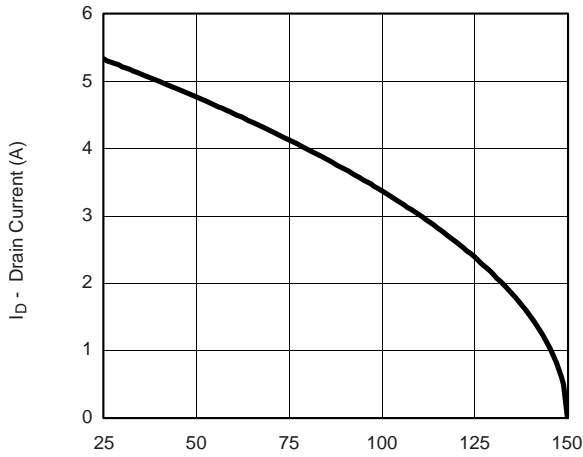
**Single Pulse Power, Junction-to-Ambient**



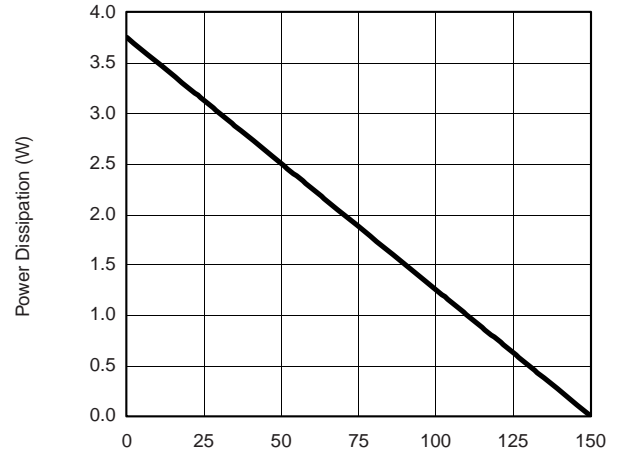
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**Safe Operating Area**

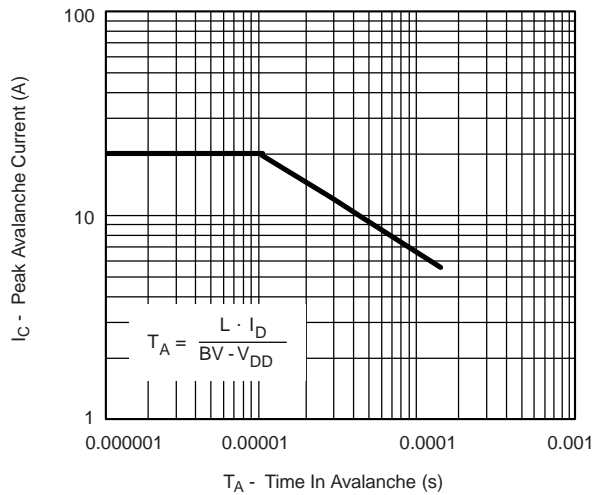
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



T<sub>C</sub> - Case Temperature (°C)  
**Current Derating\***



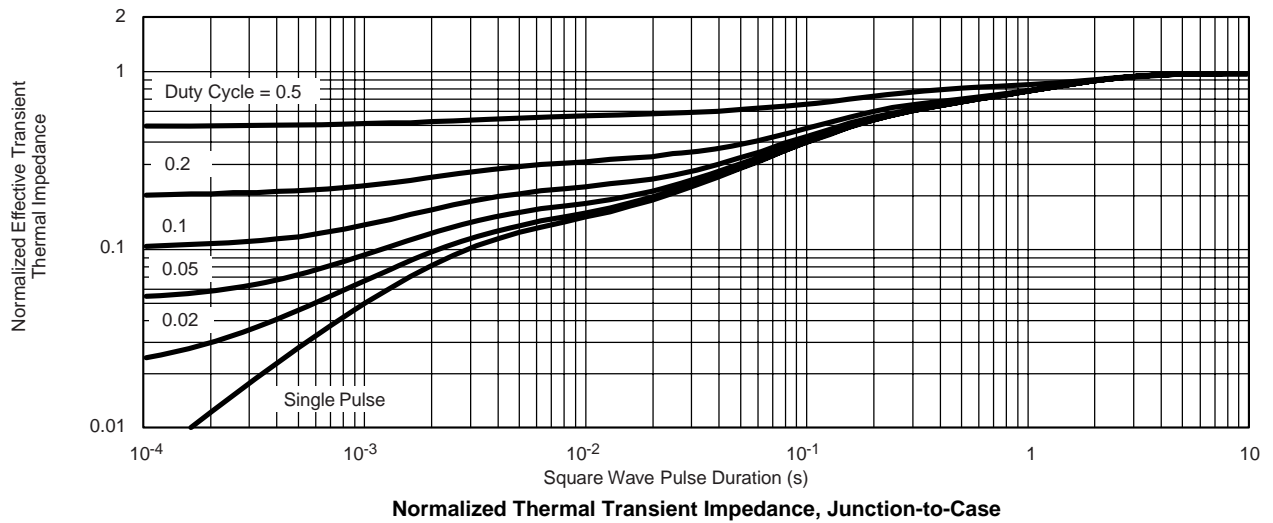
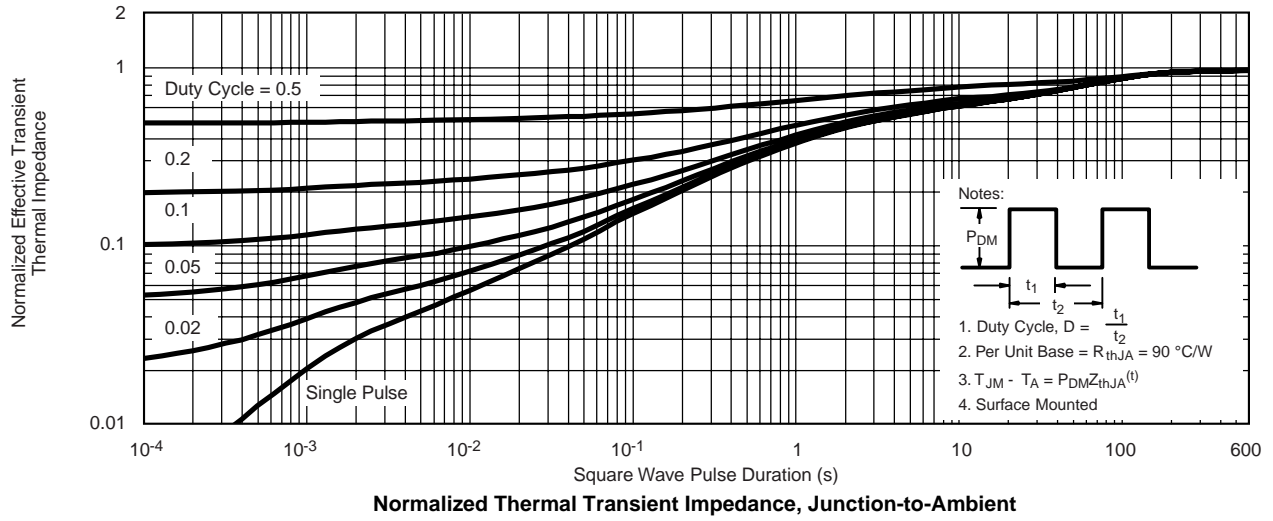
T<sub>C</sub> - Case Temperature (°C)  
**Power Derating**



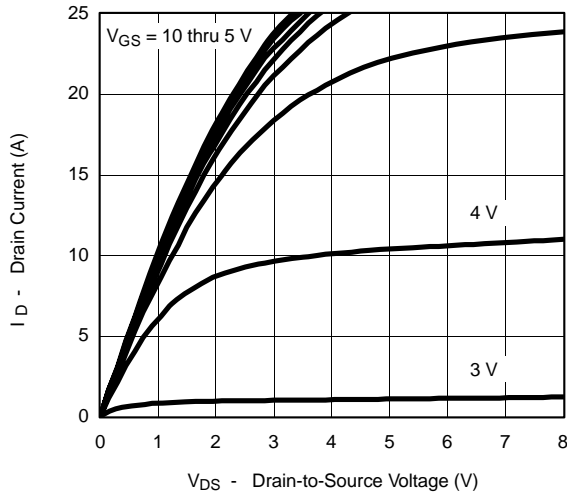
**Single Pulse Avalanche Capability**

\* The power dissipation P<sub>D</sub> is based on T<sub>J(max)</sub> = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

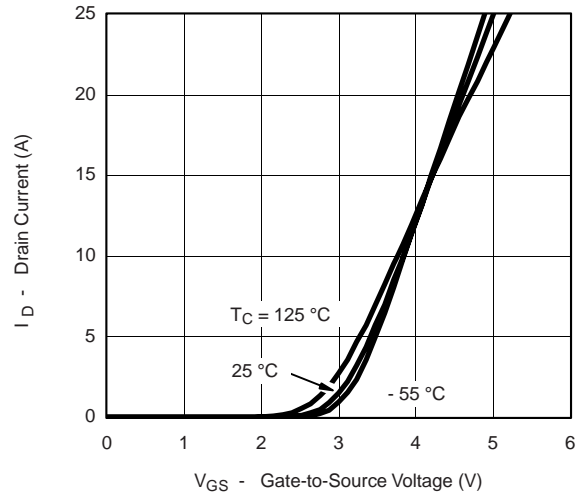
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



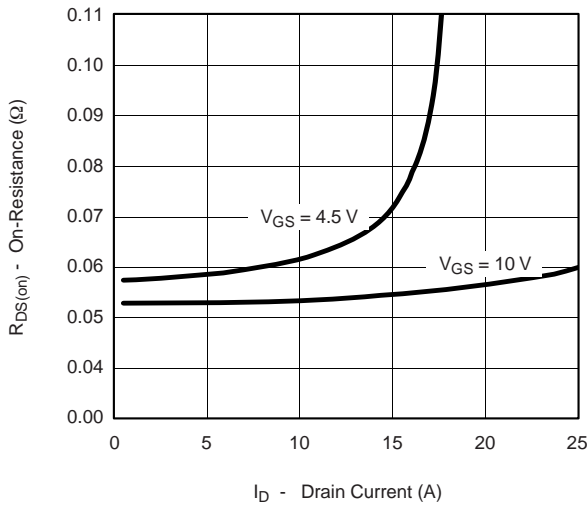
**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



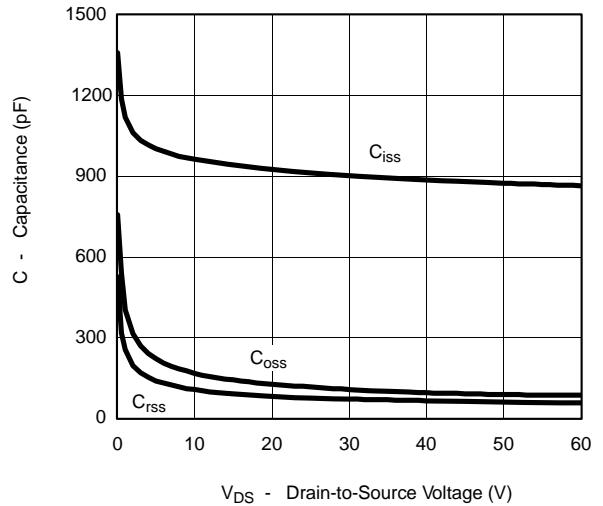
**Output Characteristics**



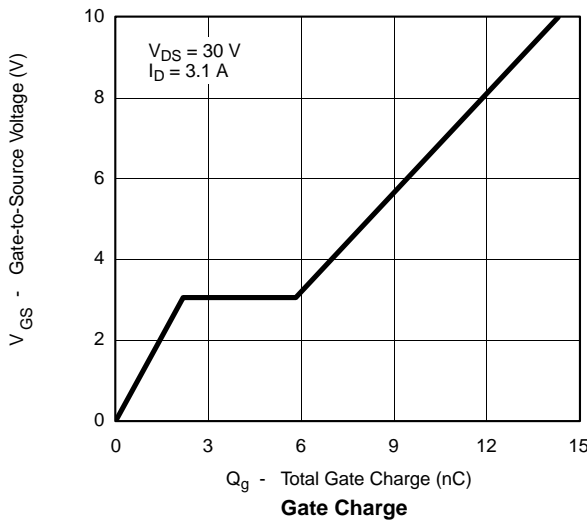
**Transfer Characteristics**



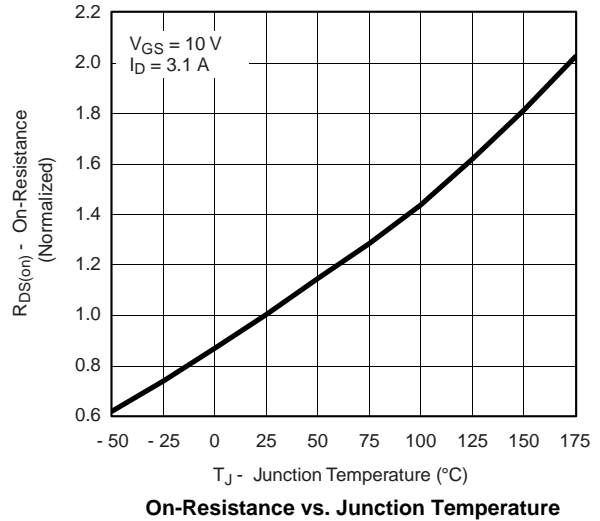
**On-Resistance vs. Drain Current**



**Capacitance**

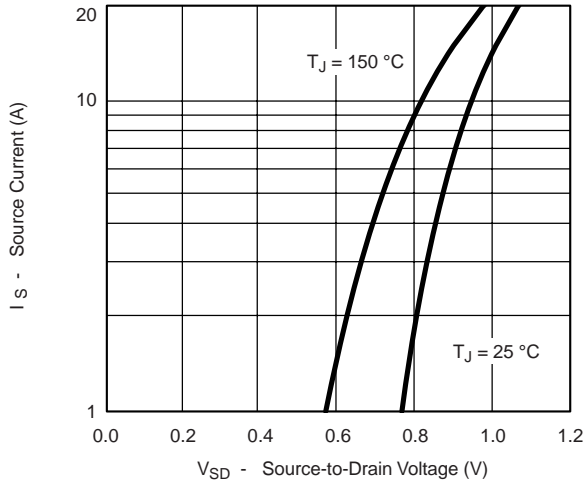


**Gate Charge**

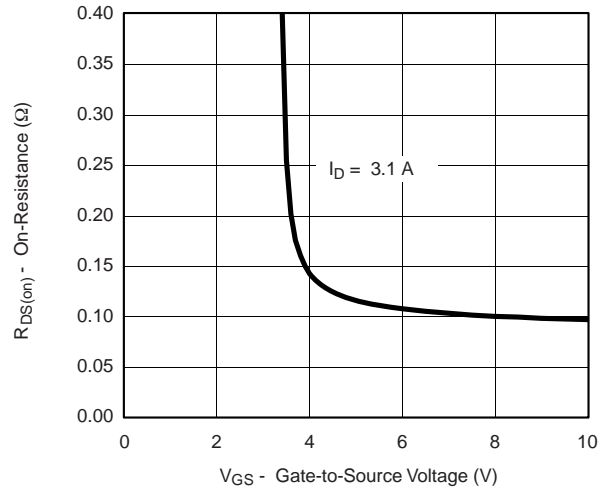


**On-Resistance vs. Junction Temperature**

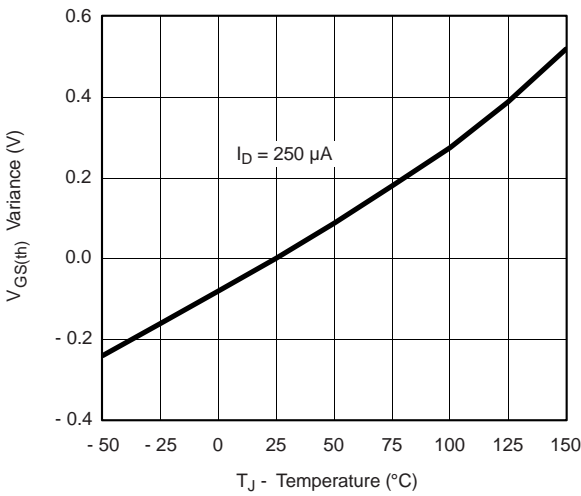
**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



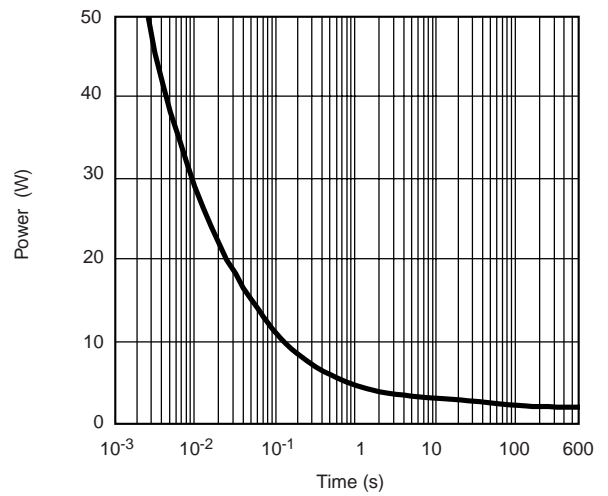
Source-Drain Diode Forward Voltage



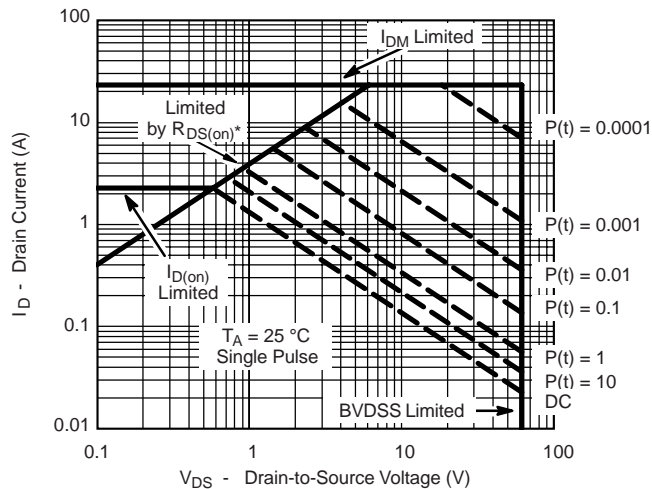
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power

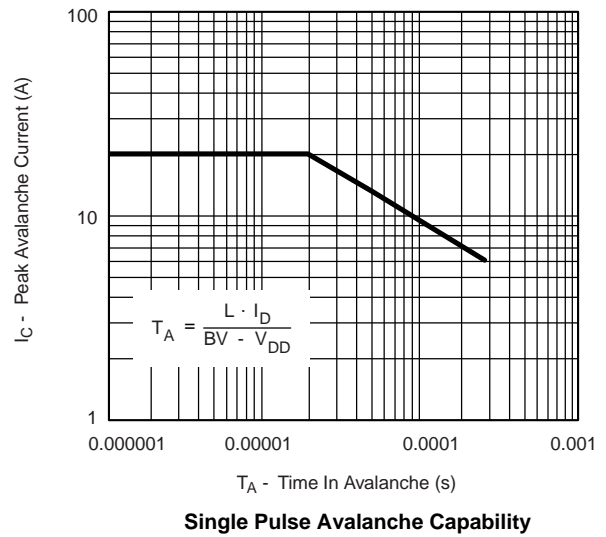
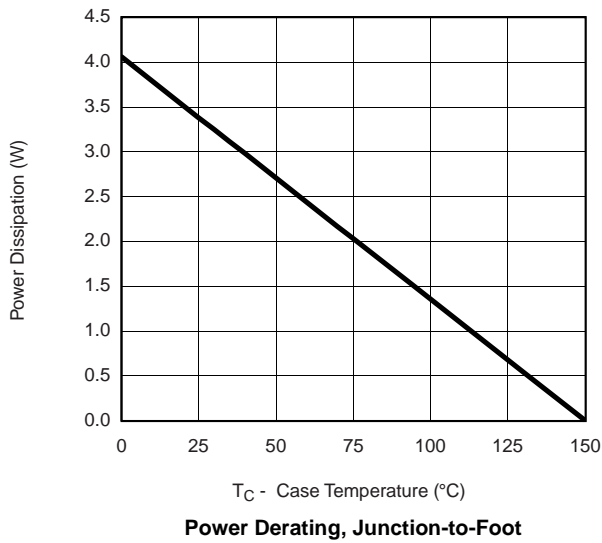
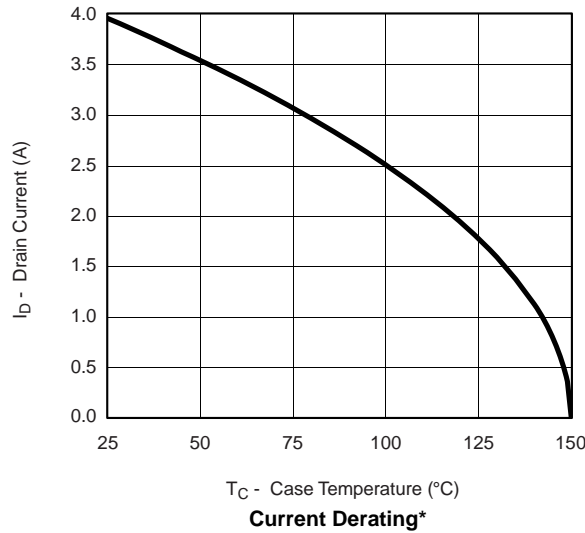


\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

Safe Operating Area, Junction-to-Case

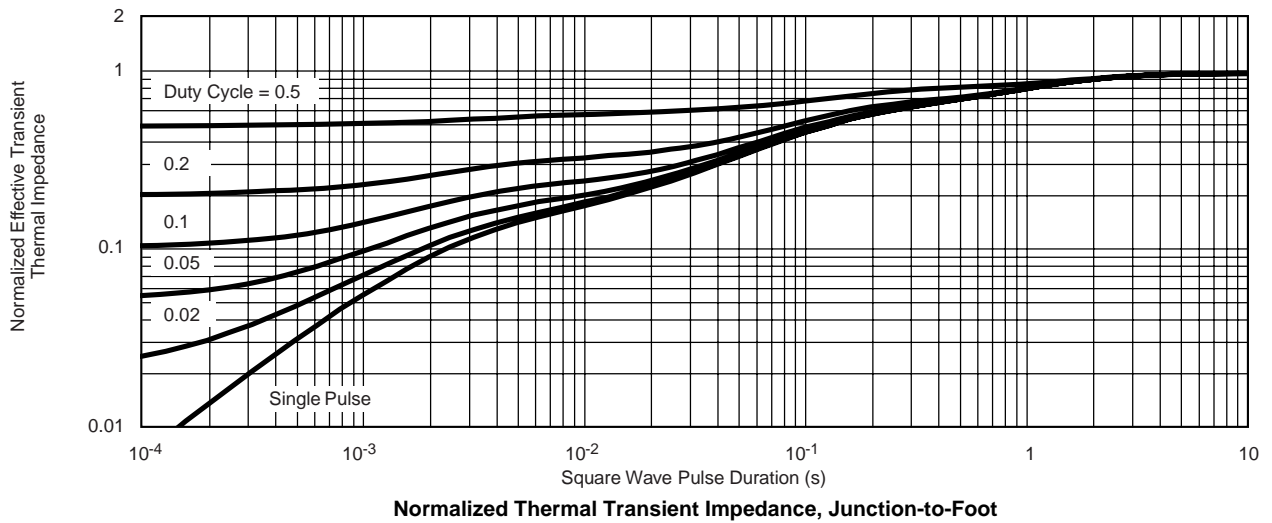
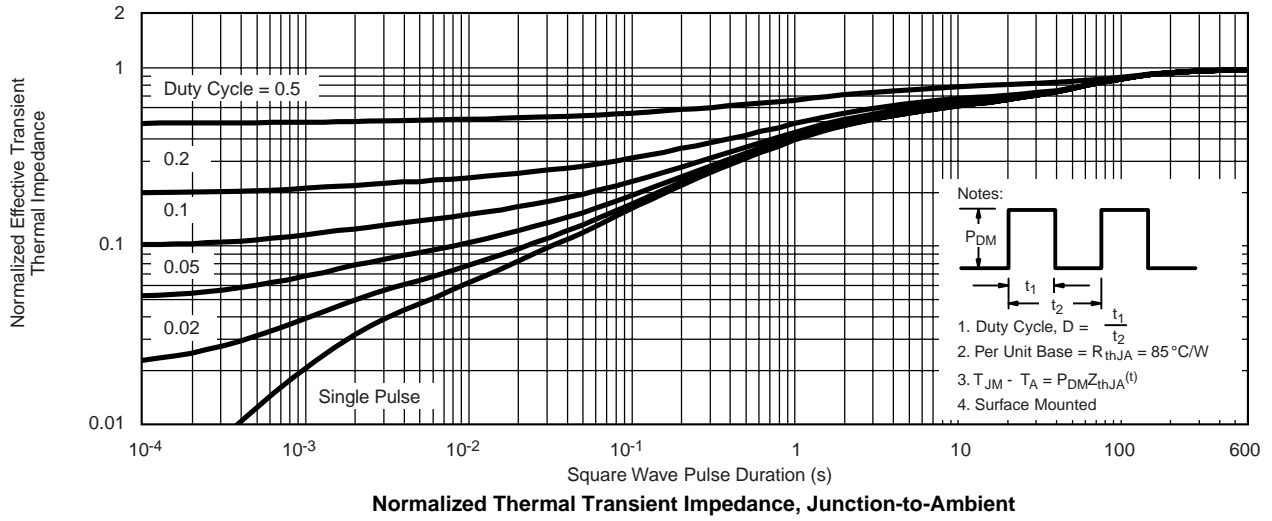


**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



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**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



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